Catalogue of American Amphibians and Reptiles.

Jenssen, Thomas A. 1990. *Anolis cooki.*

Anolis cooki Grant
Cook's Anole

Anolis cristatellus cooki Grant, 1931:221. Type-locality, "Punta Brea, southwestern Puerto Rico." Holotype, Univ. Michigan Museum of Zoology (UMMZ) 73645, an adult male, collected by Chapman Grant, 28 December 1930 (not examined by author).
Anolis cooki: Thomas, 1966:3.
Ctenonotus cooki: Schwartz and Henderson, 1988:106.

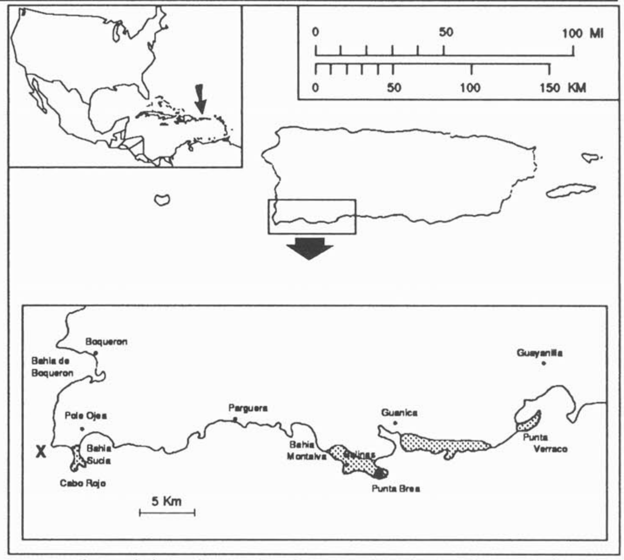
• **Content.** No subspecies have been reported.

• **Definition and Diagnosis.** A moderate-sized *Anolis* in the *cristatellus* species group series (Williams, 1976), *A. cooki* closely resembles in appearance and habits its sympatric congener *Anolis cristatellus* Duméril and Bibron. They are of similar size and body weight. The median (and maximum) snout-vent lengths (SVL) for 146 adult male and 66 adult female *A. cooki* are 63 (70) mm and 45 (49) mm, respectively, with average body weights of 5.50 and 2.03 g, respectively. In contrast, individuals from sympatric *A. cristatellus* populations have body lengths and weights that average 10% longer and 35% heavier than those of *A. cooki* (Marcellini and Jenssen, 1983; Schoener, 1970). Both species are mottled, with a highly variable body color ranging from chocolate brown to grey-brown; *A. cooki* can grade to a very light grey, more so than *A. cristatellus* (Rivero, 1978). Large males of both species may have caudal crests. Scalation differs subtly between the two species (Gorman et al., 1968); dorsal scales are larger and less numerous (30-43) in *A. cooki* and smaller and more numerous (44-68) in *A. cristatellus*, and ventral scales are keeled in *A. cooki* and smooth in *A. cristatellus*. Dewlap color tends to be orange-red in *A. cooki* and orange-yellow in sympatric *A. cristatellus*. Male and female *A. cooki* have larger tail length/SVL ratios (1.9-2.0) than *A. cristatellus* (<1.7) (Marcellini and Jenssen, 1983). *A. cooki* has an additional pair of microchromosomes (2N=29 of males) than does that of *A. cristatellus* (2N=27 of males) (Gorman et al., 1968). Electrophoretic evidence further distinguishes the two species (Gorman et al., 1980, 1983).

• **Descriptions.** Grant (1931), Gorman et al. (1968), and Rivero (1978) provided descriptions of *A. cooki*.

• **Illustrations.** A color photograph of an adult male appeared in Rivero (1978). Gorman et al. (1968) provided black and white photographs of meiotic and mitotic chromosome spreads.

• **Distribution.** Williams (1972) and Rivero (1978) gave general distributions. Marcellini et al. (1985) made a census of southwestern Puerto Rico. Augmented by unpublished records of Richard Thomas, they showed the species on the islet of Caja de Muertos, and 4 small mainland areas, each restricted to within 1 km of the shoreline. Ordered from west to east (see Map), these areas are: (1) the peninsula of Cabo Rojo, (2) followed by a gap of 25 km to the Salinas area where the species is found in approximately a 5.5 km strip from 3 km east of Salinas to Punta Brea, (3) followed by another gap of about 5 km to a point just east of Guanica where the species extends in an 8 km strip eastward, (4) and finally another gap of about 2.5 km to where the species occupies the peninsula of Punta Verraco. *A. cristatellus* broadly overlapped the entire mainland range of *A. cooki*. Marcellini et al. (1985) produced a detailed map of all *A. cooki* occurrences in the Cabo Rojo area, from Punta Aguila to Punta Molina, in order to be able to detect future changes in microdistribution (see Pertinent Literature and Comment).



Map. The solid circle marks the type-locality, the "X" marks the offshore locality, shading indicates the current range of the species (see Distribution and Comment).

Figure. *Anolis cooki* (photograph by author).

• **Fossil Record.** Late Pleistocene cave deposits in the Barahona region of central Puerto Rico yielded much *A. cristatellus*-like material; however, *A. cristatellus* specimens could not be separated from possible *A. cooki* material as the two species are osteologically indistinguishable (Pregill, 1981).

• **Pertinent Literature.** *A. cooki* was considered a xeric-adapted subspecies of *A. cristatellus* until Thomas (1966) gave it species status without evidence. Gorman et al. (1968, 1980) subsequently reported a karyotype and an electrophoretic profile distinct from *A. cristatellus,* while Gorman et al. (1971, 1983), Gorman and Stamm (1975), and Shochat and Dessauer (1981) provided karyotypic and electrophoretic evidence for phylogenetic relationships with *Anolis monensis* and other taxonomic groups. Williams (1972, 1983) developed a model for the radiation of Puerto Rican anoles, placing the "ground-trunk" *A. cooki* close to the ecologically similar *A. cristatellus,* but diverging into a more xeric, sun-exposed climatic niche. Williams (1972) suggested that the limited distribution of *A. cooki* to very hot dry areas could earmark it for extinction should the climate shift. Lister (1976a,b) concentrated on niche partitioning between *A. cooki* and *A. cristatellus* and, contrasting morphological and habitat features, indicated coexistence was possible because *A. cooki* occupied a significantly hotter climatic niche than *A. cristatellus.* Huey (*in* Hertz, 1983) indicated that *A. cooki* always regulates body temperatures precisely within narrow limits. However, Huey and Webster (1976) and Jenssen et al. (1984) did not find significant differences in body temperatures between the two species in areas of sympatry. In fact, Hillman and Gorman (1977) found that *A. cristatellus* and *A. cooki* from Cabo Rojo had the lowest water loss rates and longest survival under desiccating conditions than more mesically adapted Puerto Rican anoles. Near Guanica, Lister (1981) reported that *A. cooki* and *A. cristatellus* experience similar seasonal effects on rates of egg production and volume of ingested prey. Most recently, the body size and habitat characteristics of *A. cooki* were included in a massive data set to test the character of West Indian anoline distribution patterns (Schoener, 1988). The possibility that *A. cooki* and *A. cristatellus* are not ecologically separated was first studied by Ortiz and Jenssen (1982). The males of both species engaged in equally intense interspecific and intraspecific combat during lab-staged encounters. *A. cristatellus* dominated *A. cooki* in every case during these symmetrical encounters (males matched for SVL). Because males of each species may have been mistaking each other as conspecifics, additional experiments were conducted in which individuals were pitted against look-alike congeners (*Anolis gundlachi* and *Anolis monensis*); almost no interspecific response occurred in these cases, eliminating the possibility that aggression between the *cooki-cristatellus* pairs was due to misidentification. In the field, Jenssen et al. (1984) released male A. *cristatellus* intruders into the territories of similar-sized *A. cooki* males. Intense aggression ensued, with resident *A. cooki* able to repel only 40% of the intruding *A. cristatellus*. Jenssen et al. (1984) showed that allopatric populations of these species share the same habitat characteristics. In sympatry, *A. cooki* appeared to be displaced by *A. cristatellus* by being shifted from large clumps of vegetation (e.g. trees and large bushes) to smaller structured vegetation (e.g. small bushes, dead plants, and fence posts) providing less shade and cover.

• **Nomenclatural History.** *Anolis cooki* was long considered conspecific with *A. cristatellus*. Stejneger (1904) provided a complete description of *A. cristatellus* and Grant (1931), believing he was describing a subspecies of this taxon, primarily distinguished *cooki* by several superficial characters: chocolate colored dewlap (I have never observed this color in hundreds of specimens examined), a light body color (can become dark brown in the same individual during high arousal), and a light colored line beginning on the upper labials and extending over the forearm on a diagonal to the groin (not apparent on many specimens). Thomas (1966) raised *cooki* to species level without comment. Gorman et al. (1968) provided the first diagnostic characters for separating *A. cooki* from *A. cristatellus;* however, some characters were poorly supported. Without data, they indicated that *A. cooki* had larger dorsal scales and a lower number of lamellae on the fourth toe of the hind foot. Lister (1976b), however, showed a complete overlap in the range of fourth toe lamellae counts (means of 30 and 31) for the two species. Considering major criteria (e.g. karyotypes), *A. cooki* can be recognized as a distinct species. More descriptive work is needed, however, to produce an unequivocal list of diagnostic morphological characters for distinguishing *A. cooki* from *A. cristatellus*.

• **Etymology.** The species is named in honor of Dr. Melville T. Cook (1869-1952), a botanist who specialized in plant pathology.

• **Comment.** The distribution of *A. cooki* is very limited, discontinuous, and restricted to the sea coast. The species experiences marked competitive interference from sympatric *A. cristatellus* which are tolerant of the hot, arid habitat and aggressively displace *A. cooki* into seemingly marginal microhabitats. In some areas (e.g., Cabo Rojo) human activity destroys habitat and results in the loss of marked lizards (pers. obs.). Should local populations of *A. cooki* experience successive years of very low rainfall, the combined effects of high interspecific competition, low food availability, poor hatching success, and destructive human activity could produce local extinctions; indeed, the patchy distribution of *A. cooki* within rather homogeneous habitat supports this speculation. Should local extinctions occur, there would be few to no proximal *A. cooki* populations from which to recolonize empty habitat. *A. cristatellus* could quickly fill available openings, however, as it is continuously abundant throughout the region. Williams' (1972) belief that *A. cooki* is a species threatened with extinction seems well founded.

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